SPERRY RAND

UNIVAC®

9000

SERIES

UNIVAC 9200 AND 9300 SYSTEMS

9200

FACTS AND FIGURES

9300

UNIVAC 9000 SERIES

UNIVAC 9200 and 9300 Systems are the first of a complete new line of high performance computers—the UNIVAC 9000 Series.

This family of processors will extend to the powerful, soon-to-be-announced UNIVAC 9500 System and beyond, to progressively larger computers for every purpose and application.

Hardware, software, and program compatibility is designed into these systems. This means that as your organization grows, so can your system, right at the computer site. Each processor can become an integral part of the next level of computing power; predecessor source level programs can also be used by the upgraded systems.

Technological advances in the processors provide the highest capabilities yet designed in a series of systems. An exclusive Univac plated-wire memory is many times faster than conventional core memories. Monolithic integrated circuits in all models mean new reliability and compactness, along with reduced costs.

UNIVAC 9000 Series printers also include advanced design features, such as 60-second interchangeable type bars to permit use of specialized fonts and for faster-performance numeric printing.

The UNIVAC 9200 is an internally programmed 80-column punched card computer with exceptional memory size and speed for its price class. Processor and printer are combined in a single compact cabinet. Monthly rentals start at about $1,000 and are even lower with 5-year leasing contracts. Or, outright purchase is offered at very attractive prices.

Easy-to-learn and use software packages are tailored to punched-card computing needs. A Report Program Generator, Assembler, Gangpunch Reproducer Program, Univac's Mathpac subroutines for scientific and statistical calculations, plus debugging aids and other subroutines comprise the 9200's complete software support.

The UNIVAC 9300 is both a powerful 80-column card system and a high-speed magnetic tape system. Basic tape configurations with sort/merge capability begin at monthly rentals less than $3,000 and can be expanded to include concurrency—the processing of one main program and two peripheral programs simultaneously. Extra fast memory for this size system can keep tape drives and other peripherals performing at full rated speeds. And processing can continue during tape reading or writing.

A full complement of software completely utilizes the 9300's capabilities for both data processing and scientific applications. The package includes all of the 9200's card support plus a tape RPG, Assembler, Input-Output Control System, Tape Utilities, Sort/Merge, COBOL, FORTRAN IV, and Control Stream operations for minimized operator intervention.

And coming very soon, **The UNIVAC 9500.** The next member of the 9000 Series will be a powerful and versatile system with multi-programming and real-time capabilities.

Compatible with the 9300, the UNIVAC 9500 will combine in one system the ability to process high-speed data processing applications—complex engineering or scientific calculations—ultra-fast response for real-time networks—plus the ability for many departments to time-share the processor either from central-site or remote devices. And all of these can be operative at the same time on a multi-programming basis. The UNIVAC 9500 will offer big-system performance at medium-scale cost.

TECHNOLOGICAL INNOVATIONS

Plated-wire memory

All UNIVAC 9000 Series computers utilize a plated-wire memory, basically a thin film electroplated on an extremely fine wire. In addition to its advantages of high speed and lower cost, this memory operates in the nondestructive readout mode. Since information does not have to be rewritten into memory after each read operation, memory cycle time and power consumption are both reduced.

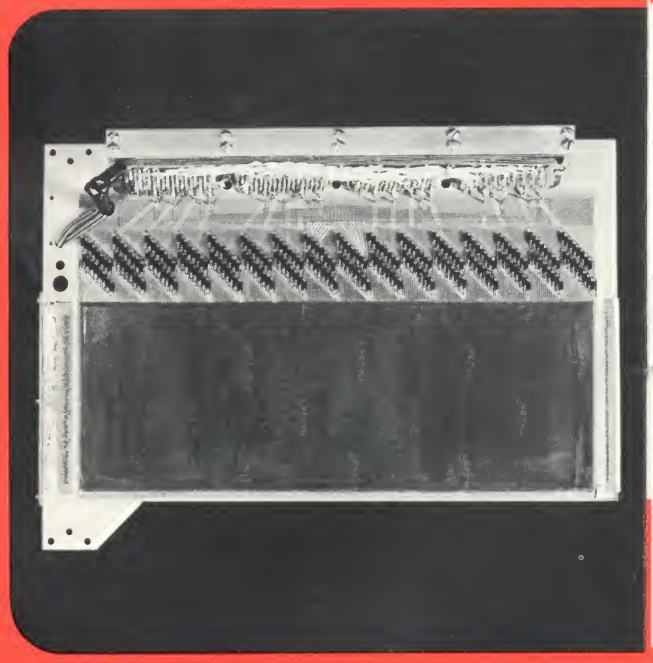
Construction is very simple, relatively inexpensive, and inherently reliable. Since the wire carrying the thin film is also part of the memory circuitry, the number of components in the memory structure is reduced and its electronic operation simplified.

Monolithic integrated circuitry

Smaller size, less power consumption, simpler construction and increased reliability are all advantages of Univac's monolithic integrated circuits.

By means of semiconductor diffusion, component layers are grown on small silicon chips in much the same way transistors are made. A typical chip may contain the equivalent of 21 transistors, 27 resistors and 3 diodes. Active circuit components (transistors, diodes) are fully integrated in diffused form.

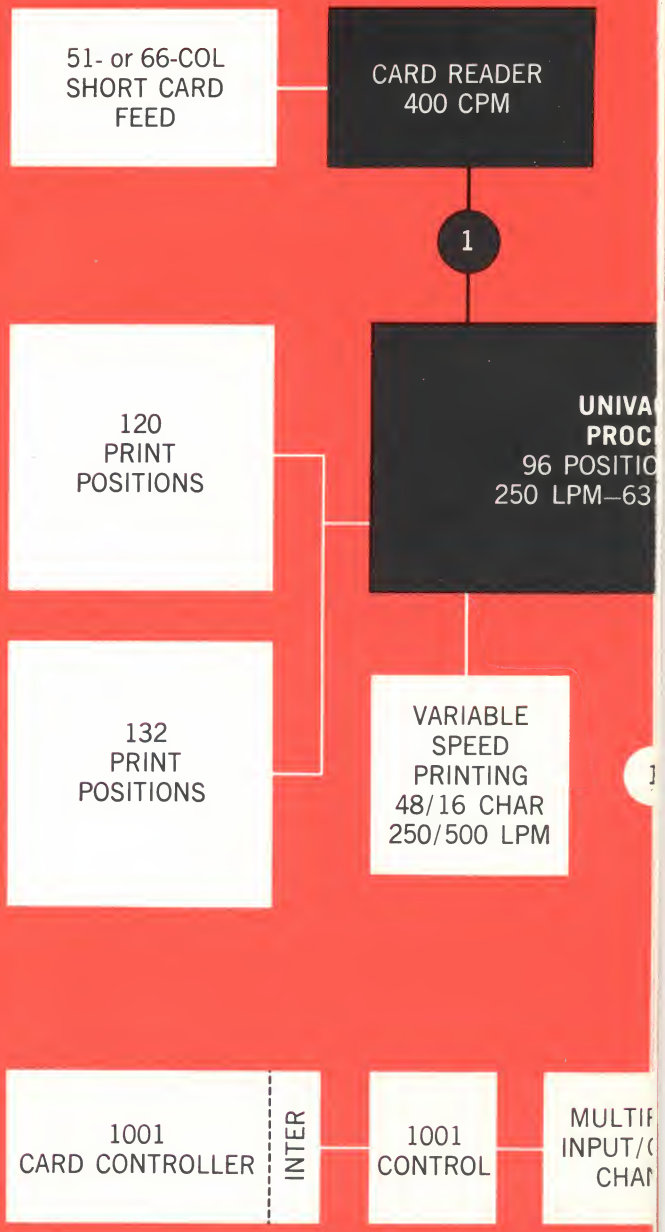
Since these components need no interconnections, high reliability is built-in and a simpler, more compact processor results. Further, faster electronic paths speed computation and reduce power consumption.



UNIVAC 9200 CARD SYSTEM

- Full memory cycle time is 1.2 microseconds.
- Memory has 8,192 storage locations or bytes, field expandable to 12,288 or 16,384 bytes.
- Each byte stores one alpha character or two numeric digits; stored information is completely addressable by bytes.
- Cards are read at 400 per minute. The optional read-punch feature for the column punch permits a second file to be read concurrently at 200 CPM. When used on-line to a 9200, the UNIVAC 1001 Card Controller increases these reading speeds by up to 2000 CPM.
- Cards are punched at 75 to 200 per minute.
- All peripheral operations are fully overlapped—can proceed independently at rated speeds for most punched-card applications.
- High-speed bar printer prints 63 alpha, numeric or special characters at 250 lines per minute. Variable speed feature employs 48-character type bar—alpha-numeric lines are printed at 250 per minute, full numeric lines at 500 per minute. 96 print positions are standard, 120 or 132 optional; any character prints in any position.
- Processor features fast instruction set and multiply-divide-edit hardware option.

9200 SYSTEM CONFIGURATOR



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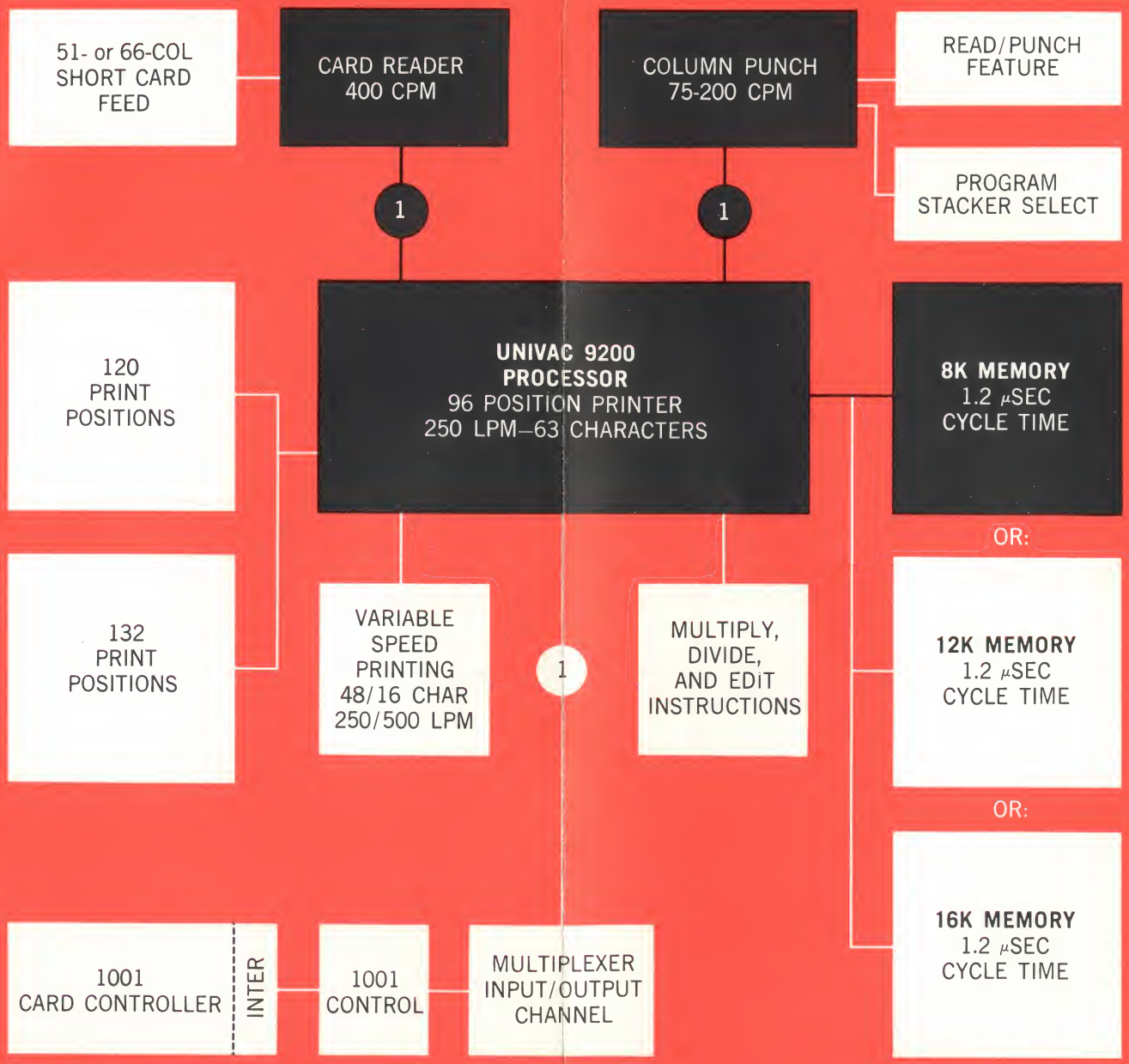

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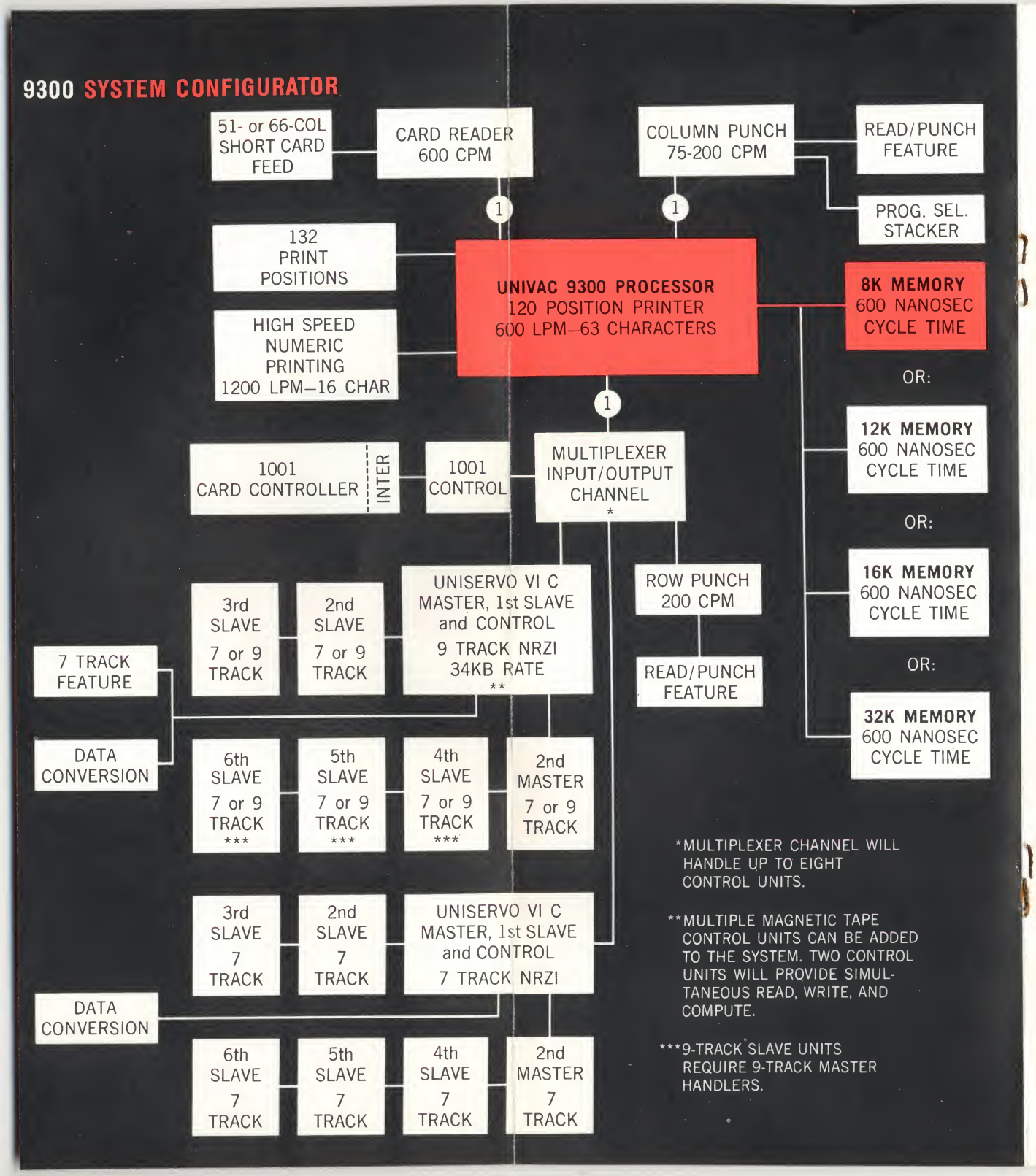

*MULTIPLEXER CHANNEL WILL HANDLE UP TO EIGHT CONTROL UNITS.

**MULTIPLE MAGNETIC TAPE CONTROL UNITS CAN BE ADDED TO THE SYSTEM. TWO CONTROL UNITS WILL PROVIDE SIMULTANEOUS READ, WRITE, AND COMPUTE.

***9-TRACK SLAVE UNITS REQUIRE 9-TRACK MASTER HANDLERS.

UNIVAC 9300 CARD/TAPE SYSTEM

- Full memory cycle time is 600 nanoseconds.
- Memory starts at 8,192 bytes, expands to 12,288, 16,384 or 32,768 bytes. Each byte contains 8 bits plus parity and can store 2 digits or one character of data or instruction.
- Cards are read at 600 per minute. Linked with the UNIVAC 1001 Card Controller, the 9300 can have multi-file input capabilities of over 2000 CPM.
- Cards are punched at 75 to 200 per minute. Optional constant speed row punch operates at 200 CPM, has read feature.
- Basic 3-drive tape system for Sort/Merge and file updating can be expanded to 8 drives with one control unit, or to 16 drives with two control units.
- Tape is ½-inch, 9-track NRZI, recorded at 800 bpi. The standard transfer rate is from 34,160 (all alpha) to 68,320 (all numeric) characters per second. A 7-track option provides reading of 7-track NRZI tapes at 200, 556 or 800 cpi.
- Processing is overlapped with card input-output, printing and tape reading or writing. Simultaneous tape reading, writing and processing is accomplished with a second control unit.
- High speed multiplexer I/O channel accepts 85,000 bytes/sec from up to 8 subsystems and 64 devices.
- Printing speed is 600 lines per minute for all 63 characters; 1200 LPM with the optional 16-character all-numeric type bar. 120 print positions are standard, 132 optional.
- 1 or 2 peripheral programs (card-to-tape, tape-to-card) can be handled concurrently with main processor run.
- Mathpac and FORTRAN IV software support is included for scientific calculations.

INSTRUCTION REPERTOIRE

Operation	Instruction	Mnemonic	Format	9300 Times in μsec (Note 1)
Binary	Store Halfword	STH	RX	20.4
	Load Halfword	LH		20.4
	Compare Halfword	CH		20.4
	Add Immediate	AI	SI	19.2
	Add Halfword	AH	RX	20.4
	Subtract Halfword	SH		20.4
Logical	Test Under Mask	TM	SI	16.8-19.2
	Move Immediate	MVI		16.8
	AND	NI		16.8
	Compare Immediate	CLI		16.8
	OR	OI		16.8
	Halt and Proceed	HPR		14.4
	Move Numeric	MVN	SS	16.8+8.4(N)
	Move Character	MVC		16.8+8.4(N)
	AND	NC		16.8+8.4(N)
	Compare Logical	CLC		(Note 3)
	OR	OC		16.8+8.4(N)
	Translate	TR		16.8+14.4(N)
	Edit (Note 2)	ED		(Note 3)
Decimal	Move with Offset	MVO	SS	$25.2+3.6(N_2)+6(N_1)$
	Pack	PACK		$25.2+3.6(N_2)+4.8(N_1)$
	Unpack	UNPK		$21.6+7.2(N_2)+4.8(N_1)$
	Zero and Add	ZAP		$26.4+3.6(N_2)+4.8(N_1)$
	Compare	CP		$26.4+3.6(N_2)+4.8(N_1)$
	Add	AP		$26.4+3.6(N_2)+4.8(N_1)$
	Subtract	SP		$26.4+3.6(N_2)+4.8(N_1)$
	Multiply (Note 2)	MP		(Note 3)
	Divide (Note 2)	DP		(Note 3)
Branch	Branch and Link	BAL	RX	18
	Branch on Condition	BC		No branch 15.6 Branch 18
State Control	Store State	SPSC	SI	24
	Load State	LPSC		18-24
Special	Supervisor Call	SRC	SI	12
I/O	Execute I/O	XIOF	SI	18-22.8
	Test I/O	TIO		

NOTES:
1. To determine 9200 instruction times, multiply stated times by 2.
2. These instructions optional on 9200, standard on 9300.
3. Detailed formulas provided in supplementary publications.

Timing for all instructions assumes no indexing. Add 3.6 μsec for each indexing operation.
N, N_1, N_2 = The number of bytes specified in the respective fields ($L + 1$, $L_1 + 1$, or $L_2 + 1$).

COMPARATIVE SPECIFICATIONS

	9200	9300
System Orientation	Card	Card/Tape
Basic Memory	8,192 bytes	8,192 bytes
Maximum Memory	16,384 bytes	32,768 bytes
Memory Cycle Time	1.2 μsec	600 nanosec
Add (Decimal) Time (Two 5 Digit Fields)	104 μsec	52 μsec
Multiply, Divide, and Edit	Optional	Standard
Card Read—Basic Reader	400 CPM	600 CPM
—1001 Card Controller	1000/2000 CPM	1000/2000 CPM
Card Punch	75-200 CPM	75-200 or 200 CPM
Read Punch Feature	Optional	Optional
Alpha Print Speed	250 LPM	600 LPM
Variable Speed Printing (Optional)	250/500 LPM	———
Numeric Printing (Optional)	———	1200 LPM
Time Shared Peripherals	Standard	Standard
Magnetic Tape Rate	———	34.16K bytes/sec
Simultaneous Tape Read, Write and Process	———	Optional
Multiplexer I/O Channel Rate	85K bytes/sec	85K bytes/sec
General Purpose Registers	8	8
Input/Output Control Registers	8	8

SOME FACTS ABOUT SOFTWARE

With the 9000 Series, you match programming capabilities with equipment configurations. The operating system covers the entire range of equipment capability; programming languages for the smaller 9000 Systems are really subsets of the languages for the larger configurations. The programming transition from one system to another is a simple growth process toward greater flexibility.

UNIVAC 9300 configurations with at least four tape units and 16K memory are fully tape-oriented and incorporate Control Stream operation. Introduced through the card reader, Control Stream governs system operation and introduces transaction data to be processed by the programs. With this approach, one properly organized card deck allows the system to process a series of jobs in an automatic, controlled sequence—without operator intervention.

In addition to Control Stream operation, fully tape-oriented 9300 Systems gain the advantage of a complete range of tape software, including an assembly system, FORTRAN IV Compiler, tape Report Program Generator and Tape Utilities. Multiple operations can be performed concurrently beginning with a 32K, five-tape system. With Concurrency, one or two peripheral tape programs (card-to-tape, tape-to-print, etc.) can be run along with the central program. This two- or three-way concurrency means faster reporting capability and more flexible program scheduling. The computer's time is utilized more efficiently and its maximum throughput capability realized.

UNIVAC 9200-9300 OPERATING SYSTEM

Memory	9200 System	9300 System	Tape Units
8K	Card RPG Reproducer Gangpunch Card Assembler Card IOCS Mathpac*	All 9200 8K card support Mathpac Tape IOCS Card to Tape Tape Print Sort/Merge	 2 2 2 3
12K	All 8K card support	All 8K support	
16K	All 8K card support	All 8K support Control Stream Tape Assembler FORTRAN IV Tape RPG Tape Utilities	 4 4 4 4 4
32K		All 8K and 16K support Concurrency COBOL	 5 6

*Requires multiply-divide-edit hardware option.

A PLANNING GUIDE FOR FASTER INSTALLATION

Univac has developed a planning guide to speed installation of 9200 and 9300 Card Systems. With its easy-to-use conversion methods and special documentation, this guide simplifies the task of preparing for a new computer. It outlines each step and shows you how to record and analyze pertinent information as the job proceeds. Special forms and work charts relate each and every step.

The guide covers these important steps in the installation of a new computer system:

Installation scheduling and control establishes management control over the conversion task so you can quickly evaluate the progress and completeness of your work.

Documenting present applications is a necessary step to reveal any operational changes that must be made before application development or programming.

Applications development sets up actual computer procedures with exact requirements for each operation in terms of improved efficiency.

Programming establishes a series of related steps or instructions which tell the computer exactly how to handle each complete problem.

The completely documented planning guide is part of the total 9000 Series hardware/software package for efficient, economical electronic data processing.

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